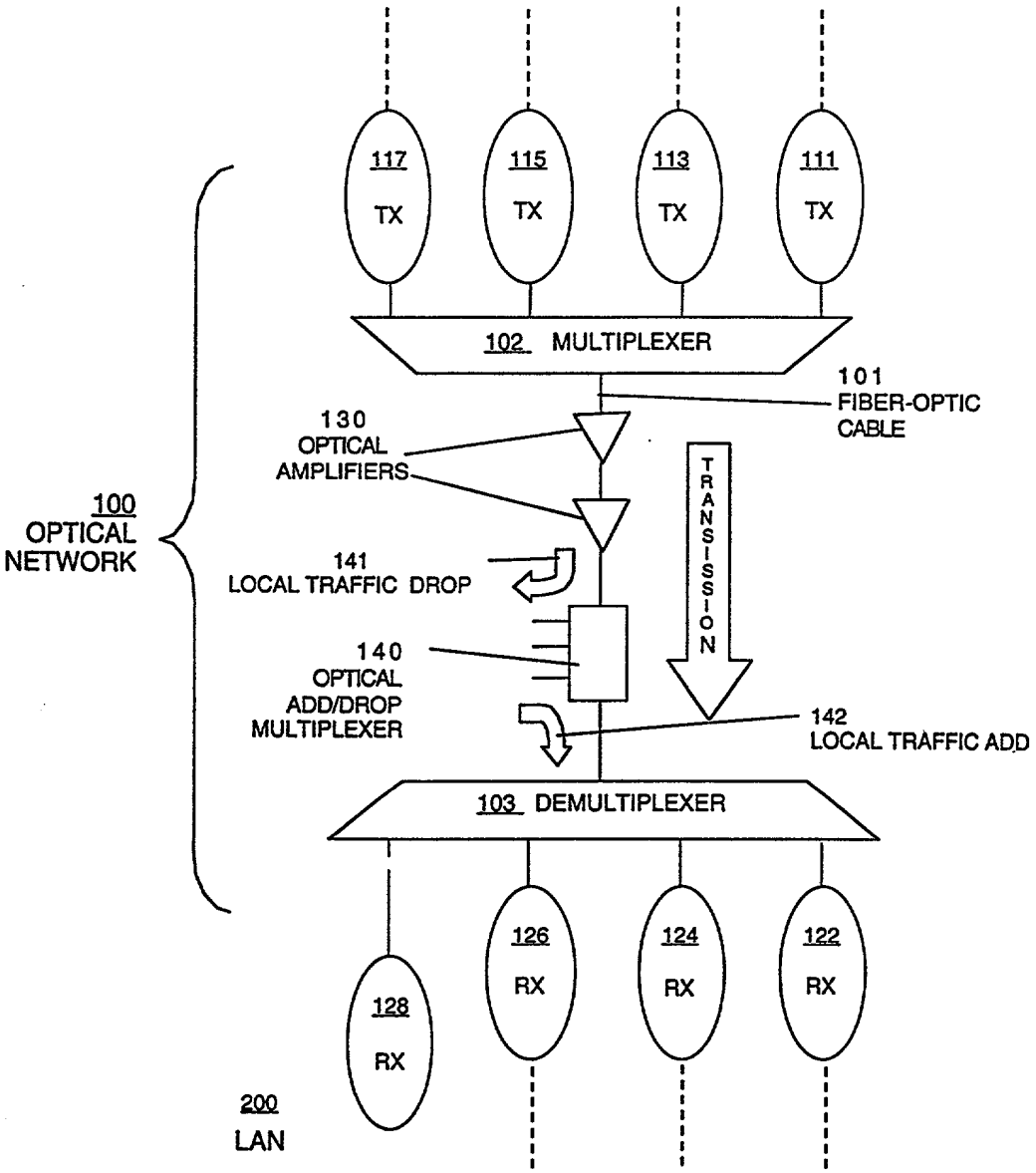
117
TX
115
TX
113
TX
111
TX
102 MULTIPLEXER
101
FIBER-OPTIC
CABLE
130
OPTICAL
AMPLIFIERS
TRANSISSION
100
OPTICAL
NETWORK
141
LOCAL TRAFFIC DROP
140
OPTICAL
ADD/DROP
MULTIPLEXER
142
LOCAL TRAFFIC ADD
103 DEMULTIPLEXER
126
RX
124
RX
122
RX
128
RX
200
LAN

FIGURE 1

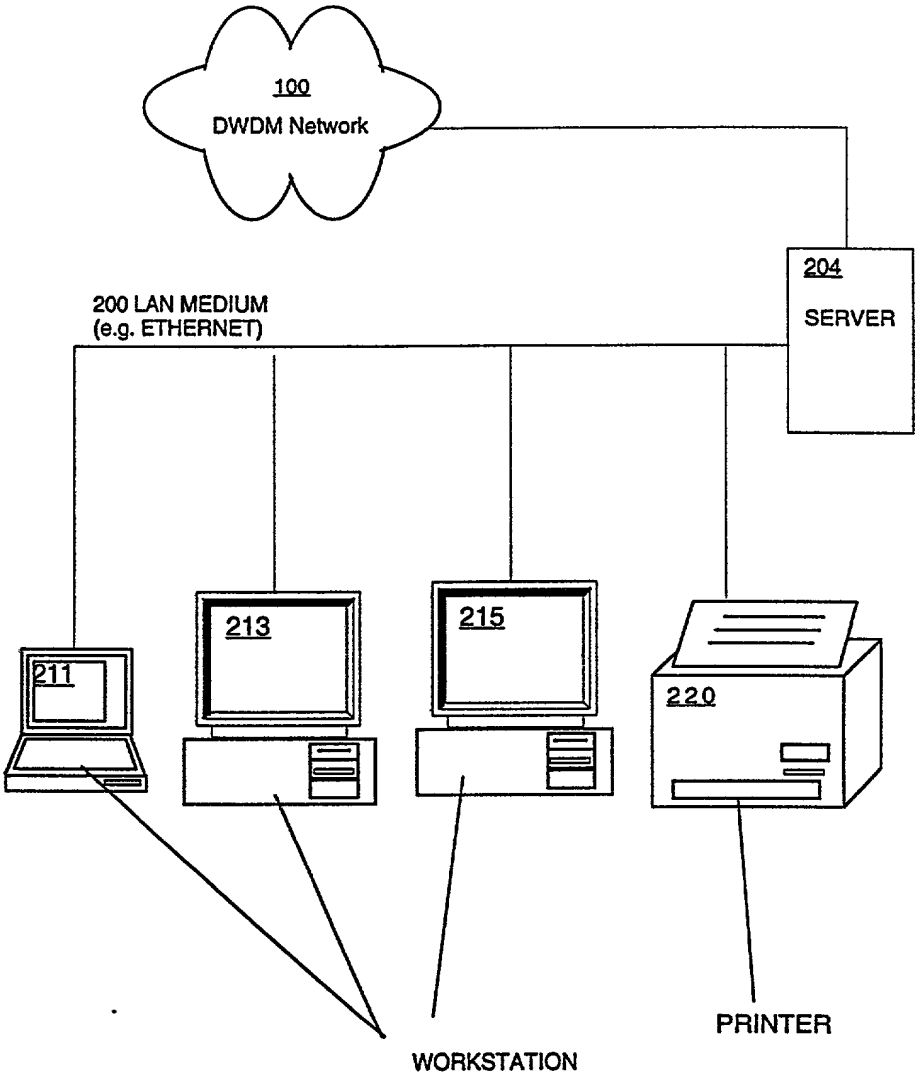
100
DWDM Network
204
SERVER
200 LAN MEDIUM
(e.g. ETHERNET)
211
213
215
220
WORKSTATION
PRINTER

FIGURE 2

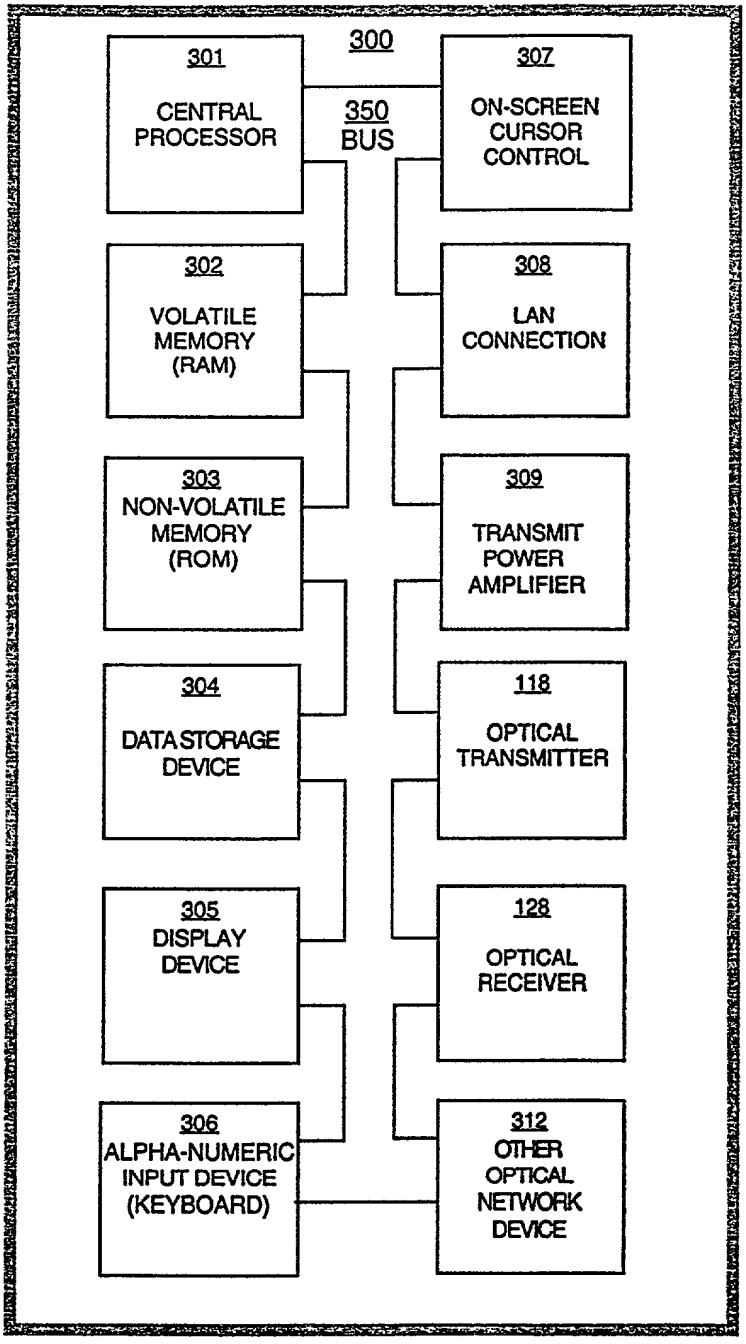
300
301
CENTRAL PROCESSOR
350
BUS
307
ON-SCREEN CURSOR CONTROL
302
VOLATILE MEMORY (RAM)
308
LAN CONNECTION
303
NON-VOLATILE MEMORY (ROM)
309
TRANSMIT POWER AMPLIFIER
304
DATA STORAGE DEVICE
118
OPTICAL TRANSMITTER
305
DISPLAY DEVICE
128
OPTICAL RECEIVER
306
ALPHA-NUMERIC INPUT DEVICE (KEYBOARD)
312
OTHER OPTICAL NETWORK DEVICE

FIGURE 3

400 TABLE OF EXEMPLARY COMMANDS AND EXPLANATIONS

Net Audit (Version X)								Net Advisor
Command	Key Variable(s)	Section	Sub Section	MIB	Poll Freq	Net Info	Net Advice	Include
RTRV-CNFGRN:::001;	Network element Name	Configuration	System		Weekly	Retrieves the name of the network element		
RTRV-VER::CMP_W-01-01-15:002;	TL1 Agent Software Version	Configuration	System		Weekly	Retrieves the software version of the TL1 agent that is running on the network element. The software version, SCC version, BIOS version and serial number are returned.		
RTRV-IPADDR::CMP_W-01-01-15::003;	IP Address	Configuration	System		Weekly	Retrieves the IP address of the network element. Additionally returns the subnet mask and gateway addresses.		
RTRV-NETYPE:::004;	NE Type	Configuration	System		Weekly	Retrieves the network element vendor name, element model and element type. the supported element types are TERMINAL, OLA, OADM and LEM sites. Must be running version 1.3.0 or greater of the TL1 agent to use this command.		
RTRVEQPT:SOFTLINE2:ALL:004;	Board Name and board Posistion	Configuration	System		Weekly	Retrieves the presence and status of equipment and facilities for the network element.		
RTRV-VER:SOFTLINE2:ALL:005	Software Version of Each Card.	Configuration	System		Weekly	Retrieves the software version running on each board. The software version, SCC version, Bios version and serial number are returned.		
RTRV-WRKP::PRE_L-01-01-04:005;	Working Point Values	Fault	System			Retrieves the working point of various points of measure for the PRE-L board. If no working point value is returned, it means that it is currently set to zero.		√
RTRV-PM: SOFTLINE2:PRE_L-01-01-04:006::-999-UP;	Current retrieved value	Fault	System		Daily	Retrieves the current value of various points of measure for the PRE_L board.		√
RTRV-TH::PRE_L-01-01-04:007;	Threshold value	Fault	System		Daily	Retrieves threshold values of various points of measure for the PRE_L board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.	Verify input power, output power and laser current values and thresholds. If temperature is related, verify environmental conditions. Check for associated alarm status messages. Fault isolate to the board level	√
RTRV-TH::8WD_B-01-01-07::001;	Temperature values	Fault	System		Daily	Retrieves threshold values of various points of measure for the 8WD board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.	Verify environmental conditions. Check for associated alarm status messages. Fault isolate to the board level.	√
RTRV-WRKP::8WD_B-01-01-07::002;	Temperature working points	Fault	System		Daily	Retrieves the working point of various points of measure for the 8wd board. If no working point value is returned, it means that it is currently set to zero.		√
RTRV-PM::8WD_B-01-01-07::003;	Temperature actual value	Fault	System		Daily	Retrieves the current value of various points of measure for the 8WD board.		√
RTRV-TH::TPA_R-01-01-01:001;	Laser Power	Fault Performance	System		Daily	Retrieves threshold values of various points of measure for the TPA board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.	Verify input power, output power and laser current values and thresholds. If temperature is related, verify environmental conditions. Check for associated alarm status messages. Fault isolate to the board level	√
RTRV-WRKP::TPA_R-01-01-01:002;	Laser Power	Fault Performance	System		Daily	Retrieves the working point of various points of measure for the TPA board. If no working point value is returned, it means that it is currently set to zero.		√

FIGURE 4A

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400 TABLE OF EXEMPLARY COMMANDS AND EXPLANATIONS (Cont.)

Net Audit (Version X)								Net Advisor
Command	Key Variable(s)	Section	Sub Section	MIB	Poll Freq	Net Info	Net Advice	Include
RTRV-PM: TPA_R-01-01-01:003::,-999-UP;	Laser current and output	Fault Performance	System		Daily	Retrieves the current value of various points of measure for the TPA board.		√
RTRV-TH::WCM_EM_N05-01-03-05:001;	Laser input and output power	Fault Performance	System		Daily	Retrieves threshold values of various points of measure for the TPA board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.	Verify input power, output power and laser current values and thresholds. Check for associated alarm status messages. Fault isolate to the board level.	√
RTRV-WRKP:: WCM_EM_N05-01-03-05:002;	Laser temperature	Fault Performance	System		Daily	Retrieves the working point of various points of measure for the WCM board. If no working point value is returned, it means that it is currently set to zero.		√
RTRV-PM::WCM_EM_N05-01-03-05:003::,-999-UP;	Laser current, power and output	Fault Performance	System		Daily	Retrieves the current value of various points of measure for the WCM board.		√
RTRV-PM: LEM_EM_M12-01-03-12:001::,-999-UP;	Power, current and limits.	Fault Performance	System		Daily	Retrieves the current value of various points of measure for the LEM board.		√
RTRV-WRKP::SCF_W-01-03-17:001;	Fan, Current and Battery Levels	Fault	System		Daily	Retrieves the working point of various points of measure for the SCF board. If no working point value is returned, it means that it is currently set to zero or no working points exist for the board type.		√
RTRV-PM: SCF_W-01-03-17:002::,-999-UP;	Fan, Current and Battery Levels	Fault	System		Daily	Retrieves the current value of various points of measure for the SCF board.		√
RTRV-TH::SCF_W-01-03-17:003;	Fan, Current and Battery Limits	Fault	System		Daily	Retrieves threshold values of various points of measure for the SCF board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.	Verify current, DC converter and battery control values and thresholds. Check for associated alarm status messages. Fault isolate to the board level.	√
RTRV-WRKP::IOC-01-01-16:001;	Analog input levels	Configuration	System		Daily	Retrieves the working point of various points of measure for the IOC board. If no working point value is returned, it means that it is currently set to zero.		√
RTRV-PM::IOC-01-01-16:002,-999-UP;	Analog input levels	Configuration	System		Daily	Retrieves the current value of various points of measure for the IOC board.		√
RTRV-TH::IO-01-01-16:003;	Analog input levels	Configuration	System		Daily	Retrieves threshold values of various points of measure for the IOC board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.		√
RTRV-TH::LSM_W-01-01-13:001;	Laser power output	Fault Performance	System		Daily	Retrieves threshold values of various points of measure for the IOC board. Thresholds could include Degrade, Fail, High, Low Medium and High Medium.	Verify the analogic input and output values and thresholds. Check for associated alarm status messages. Fault isolate to the board level.	√
RTRV-PM::LSM_W-01-01-13:002::,-999-UP;	Laser current, power and output.	Fault Performance	System		Daily	Retrieves the current value of various points of measure for the LSM board.		√
RTRV-WRKP::LSM_W-01-01-13:003;	Laser temp and power limits	Fault Performance	System		Daily	Retrieves the working point of various points of measure for the LSM board. If no working point value is returned, it means that it is currently set to zero.		√
RTRV-ALM::ALL:001;	Retrieves alarm status	Fault	System Media		Hourly	Retrieves the alarm or alarms associated with all board types of the specified network element.	Check alarms messages per network element and network wide. Look for common cause of multiple alarms. Verify the current values and threshold values for help in troubleshooting. Fault isolate to the board level.	√

FIGURE 4B

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500 TABLE OF EXEMPLARY COMMAND RESPONSES AND EXPLANATIONS

Net Audit (Version X)		
Command	RESPONSE	Net Advice
RTRV-CNFGRN:::001;	SOFTLINE2 00-07-18 09:01:38 M 001 COMPLD "SOFTLINE2";	
RTRV-VER::CMP_W-01-01-15:002;	SOFTLINE2 00-07-18 09:01:38 M 001 COMPLD "SOFTLINE2": "CMP"_W-01-01-15:1.1.2-A,1.0.0,1.0.0,1234678"	NETWORK ELEMENT NAME SOFTWARE VERSION
RTRV-IPADDR::CMP_W-01-01-15:::003;	SOFTLINE2 00-07-18 09:43:44 M 003 COMPLD; "CMP"_W-01-01-15:165.122.231.52,255.255.255.0,165.122.231.90"	
RTRV-NETYPE:::004;		

510 EXAMPLE RESPONSE PARSING

Query: RTRV-NETYPE:::004;

Response: "CISCO,ONS15800,TERMINAL SITE,NE-V1.5"

FIELD: 1D 2D 3D 4D 5D

Index Number	Field Name	OUTPUT
1A	Network Element Name	PIR_MA_CNFGRN
1D	Vendor Name	PIR_MA_NETYPE
2D	Network Element Model Number	PIR_MA_NETYPE
3D	Network Element Type	PIR_MA_NETYPE
4D	Keyword SITE	PIR_MA_NETYPE
5D	Network Element Version	PIR_MA_NETYPE

Query: RTRV-EQPT:SOFTLINE2:ALL:004;

Response: "PRE_L -01-01-01: IS-NR"
Response: "RBA -01-01-02: IS-NR"
Response: "BBA -01-01-01: IS-NR"
Response: "PRE_L -01-01-01: IS-NR"
Response: "RBA -01-01-01: IS-NR"
Response: "BBA -01-01-01: IS-NR"
Response: "EOI_W -01-01-01: IS-NR"
Response: "LSM_W -01-01-01: IS-NR"
Response: "CMP_W -01-01-01: IS-NR"
Response: "IOC_W -01-01-01: IS-NR"
Response: "SCF_W -01-01-01: IS-NR"
FIELD: 1E 2E 3E 4E

Index Number	Field Name	OUTPUT
1A	Network Element Name	PIR_MA_CNFGRN
1E	Board Name	PIR_MA_EQPT
2E	Rack Position	PIR_MA_EQPT
3E	Sub-Rack Position	PIR_MA_EQPT
4E	Slot Position	PIR_MA_EQPT

FIGURE 5

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600 Example DWDM Optical Network Audit Report **OVERVIEW**

Section	Name	Description
1	Executive Summary	High level summary of network defined as Network Health
2	Net Audit Detail	Values, exceptions and Net Rule Exception Points (NREPs) Identified and broken down by node.
3	Net Audit Task List	General and network specific advice and information for resolving issues uncovered in the audit.
Appendix A	General Module Info	Details of NREPs, values and exceptions are dealt with in detail.
Appendix B	Device Unreachable Info	Lists the devices not included in this audit.

610 Example DWDM Optical Network Audit **NET AUDIT COLLECTION SUMMARY**

Name	Result
Collection Period	7 Days
Collection Start Time	CollectionStart
Collection Stop Time	(date here)
***Unreachable Nodes	Unreachable

620 Example DWDM Optical Network Audit **Net Audit NREP Summary**

Name	Result
Critical NREPs:	(Number of Critical NREPs) $Critical_NREP
Warning NREPs:	(Number of Warning NREPs) $Warningl_NREP
Total NREPs:	(Total number NREPs) $Total_NREP
Total Possible NREPs:	(Total Possible NREPs) $Possible_NREP
Net Audit Health	((Total NREPs / Total Possible NREPs) x 100) $Net_Health

Note: Ranking Formula: (Actual NREPs / Total NREPs) x Traffic Co-efficient

630 Audit Exception Detail Table

Fault Management		Performance Management		Capacity Planning Management		Configuration Management	
System		System		System		System	
Media		Media		Media		Media	
Protocol		Protocol		Protocol		Protocol	
Total NREPs		Total NREPs		Total NREPs		Total NREPs	

FIGURE 6

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700 CONFIGURATION MANAGEMENT Example

710 Network Element Table

Network Element Name	TL1 Agent Software Version	IP Address	Uptime (Days)

720 Board Table

Network Element Name	Board Name	Board Position			Serial Number
		R (rack)	SR (subrack)	S (slot)	

FIGURE 7

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800 MEDIA ANALYSIS Example

810 Pre-L Board Table (RESULT EXAMPLE)

Network Element Name	Board Name	Board Position				Laser 1			Input Power	Output Power	
		R	SR	S		Temp	Current	Power		Blue	Red
SOFTLINE2	PRE_L	1	1	4	WP	25.000	NA		NA	NA	NA
					CV	25.000	146.330	80.430	-15.710	-5.017	10.884
					TH1	HIGH 28.000	DEG 176.000	DEG 72.000	DEG -23.497	DEG 1.492	DEG -12.07
					TH2	LOW 22.000	FAIL 290.000	FAIL 10.000	FAIL -29.508	FAIL -1.002	FAIL -13.01
					TH3	NA	LOW 25.000	NA	NA	NA	NA

820 8WD-B AND 24WD_R (Demultiplexer) Board Table (RESULT EXAMPLE)

Network Element Name	Board Name	Board Position				Average Temperature
		R	SR	S		
EAST	8WD_B	1	1	7	WP	78.020
					CV	78.020
					TH1	HIGH 93.020
					TH2	HMID 81.020
					TH3	LMID 75.020
					TH4	LOW 63.030

830 RBA, BBA, TPA-R, TPA-B (Booster and Transmitter Amplifiers) Board Table (RESULTS EXAMPLE)

Network Element Name	Board Name	Board Position				Laser 1			Laser 2			Input Power	Output Power
		R	SR	S		Temp	Current	Power	Temp	Current	Power		
EAST	TPA_R	1	1	1	WP	25.000	NA	75.000	25.000	NA	50.000	NA	NA
					CV	25.000	137.660	80.430	25.010	91.990		-13.160	12.812
					TH1	HIGH 28.000	DEG 157.000	DEG 157.000	HIGH 28.000	DEG 157.000		HIGH -5.003	HIGH 12.761
					TH2	LOW 22.000	FAIL 250.000	FAIL 250.000	LOW 22.000	FAIL 250.000		DEG -28.013	DEG 9.196
					TH3	NA	LOW 25.000	NA	NA	LOW 25.000		FAIL -30.507	FAIL 6.990

FIGURE 8A

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840 LEM, RXT and WCM (Channel Board) Table

Network Element Name	Board Name	Board Position			CH. NUM.		Laser 1			Laser 2			Input Power		Output Power	
		R	SR	S			Temp	Current	Power	Temp	Current	Power	Inst. 1	Inst. 2	Inst. 1	Inst. 2
EAST	WCM	1	3	5	5	WP	25.400	NA	NA				NA		NA	
						CV	25.650	61.460	9.951				-3.131		0.083	
						TH1	HIGH 27.390	DEGJ 72.650	HIGH 12.000				[illegible]		HIGH 1.004	
						TH2	LOW 23.400	FAIL 84.750	LOW 8.000				LOW -19.208		LOW -1.029	

850 ADA (ADD/DROP AMPLIFIER) BOARD TABLE

Network Element Name	Board Name	Board Position				Laser 1			Laser 2			Input Power		Output Power	
		R	SR	S		Temp	Current	Power	Temp	Current	Power	Inst. 1	Inst. 2	Inst. 1	Inst. 2
OADMSITE	ADA	1	1	6	WP										
					CV										
					TH1	HIGH	LOW	DEG	HIGH	LOW	DEG	DEG	DEG	DEG	DEG
					TH2	LOW	DEG	FAIL	LOW	DEG	FAIL	FAIL	FAIL	FAIL	FAIL
					TH3	NA	FAIL	NA	NA	FAIL	NA	NA	NA	NA	NA

860 OADM (Optical Add/Drop Multiplexer)

Network Element Name	Board Name	Board Position				Laser Temperature 1	Laser Temperature 2
		R	SR	S			
OADMSITE	OADM-P4-B1	1	1	6	WP		
					CV		
					TH1	HIGH	HIGH
					TH2	LOW	LOW
					TH3		

FIGURE 8B

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870 SCF Board Table

Network Element Name	Board Name	Board Position				Fan Current				DC Converter	Battery Control
		R	SR	S		Inst. 1	Inst. 2	Inst. 3	Inst. 4		
					WP						
					CV						
					TH1						
					TH2						
					TH3						

880 IOC Board Table

Network Element Name	Board Name	Board Position				Analogic Input/ Output							
		R	SR	S		1	2	3	4	5	6	7	8
					WP								
					CV								
					TH1								
					TH2								
					TH3								

890 LSM Board Table

Network Element Name	Board Name	Board Position				Laser East		Laser West		Output Power	
		R	SR	S		Temp	Current	Temp	Current	Inst. 1	Inst. 2
					WP						
					CV						
					TH1						
					TH2						
					TH3						

FIGURE 8C

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900 PERFORMANCE ANALYSIS EXAMPLE

910 B1 Monitoring Board Table

Network Element Name	Board Name	Board Position			Ch. Num.	Current				15 Minute				24 Hour			
		R	SR	S		ES	SES	BBE	UT	ES	SES	BBE	UT	ES	SES	BBE	UT

920 Alarm Status Table

Network Element Name	Board Name	Board Position			Alarm Status	NREPs
		R	SR	S		

1000 Capacity Planning Example

1010 Board Software Table

Board Name	Software Version	Network Element Name	Board Position		
			R	SR	S

FIGURE 8D

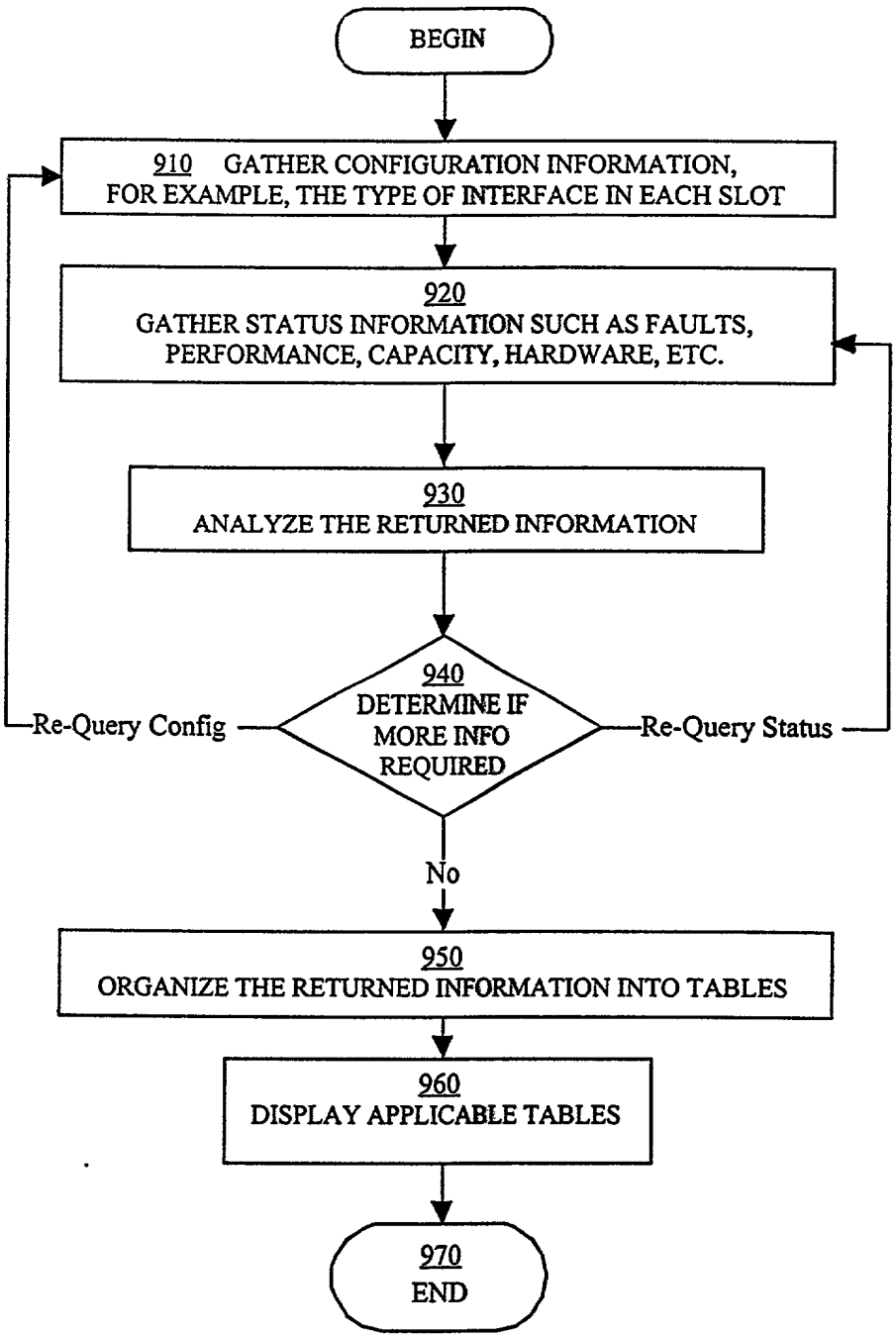
900
BEGIN
910 GATHER CONFIGURATION INFORMATION, FOR EXAMPLE, THE TYPE OF INTERFACE IN EACH SLOT
920
GATHER STATUS INFORMATION SUCH AS FAULTS, PERFORMANCE, CAPACITY, HARDWARE, ETC.
930
ANALYZE THE RETURNED INFORMATION
940
DETERMINE IF MORE INFO REQUIRED
Re-Query Config
Re-Query Status
No
950
ORGANIZE THE RETURNED INFORMATION INTO TABLES
960
DISPLAY APPLICABLE TABLES
970
END

FIGURE 9